

DESCRIPTION OF THE COURSES

- Course code: ELR3373
- Course title: *ELECTRICAL METROLOGY I*
- Language of the lecturer: *polish*

<i>Course form</i>	<i>Lecture</i>	<i>Classes</i>	<i>Laboratory</i>	<i>Project</i>	<i>Seminar</i>
<i>Number of hours/week*</i>	2		1		
<i>Number of hours/semester*</i>	20		10		
<i>Form of the course completion</i>	Test		Acceptance		
<i>ECTS credits</i>	2		1		
<i>Total Student's Workload</i>	50		40		

- Level of the course (basic/advanced): *basic*
- Prerequisites: *It corresponds to the basic studies subject of Electrical Faculty*
- Name, first name and degree of the lecturer/supervisor: *Zdzisław Nawrocki prof.*
- Names, first names and degrees of the team's members:
 - Jerzy BARTOSZEWSKI PhD*
 - Grzegorz KOSOBUDZKI PhD*
 - Daniel DUSZA PhD*
- Year: II Semester: 3.....
- Type of the course (obligatory/optional): *obligatory*
- Aims of the course (effects of the course): Students knowledge will be in range:
 - errors and uncertainty of measurements work out,
 - uses of classical current, voltage and power meters,
 - measurements of currents, voltages and powers in one and three-phase power net.
- Form of the teaching (traditional/e-learning): *traditional*
- Course description:

Basic knowledge of electrical metrology is presented. The structure and principle of operation the analogue and digital meter, typical measuring methods, the direct and indirect ways of electric quantities measurement are discussed. Evaluation of uncertainty of measurement.
- Lecture:

<i>Particular lectures contents</i>	<i>Number of hours</i>
<i>1. Introduction. Basis terms of metrology.</i>	<i>2</i>
<i>2. Results of measurement, error and its interpretation. Uncertain of measurement</i>	<i>2</i>
<i>3. Random variable and its distribution. Standard uncertainty of measurement. Rectangular distribution, triangle distribution, t-Student distribution.</i>	<i>2</i>
<i>4. Type A and B evaluation of standard uncertainty in direct measurement</i>	<i>2</i>
<i>5. Indirect measurements of electric quantities, source of uncertainty. Example of calculation.</i>	<i>2</i>
<i>6. Electric constant and variable signals. Parameters of signals.</i>	<i>1</i>
<i>7. Analog transducer – principle of operation. metrological properties of</i>	<i>2</i>

<i>electric meter in direct current circuit.</i>	
8. <i>Metrological properties of electric meter in alternative current circuit. Mean value transducer, RMS transducer, and metrological properties of multimeter.</i>	2
9. <i>Soft iron instrument use as ammeter, voltmeter. Wattmeter. Feature of watt meters.....</i>	2
10. <i>Measurement of power of one phase circuits. Voltage, current instrument transformers, metrological properties.</i>	2
11. <i>Test.</i>	1

- Classes – the contents:
- Seminars – the contents:
- Laboratory – the contents:
 - a) *Study of the metrological characteristics of the typical electric measuring instruments (analogue and digital measuring instruments, oscilloscope, AD converter, DA converter, standards) and direction for use them.*
 - b) *Principle of chosen measuring methods, circuits and tools for measuring basic electrical quantities like current, voltage, frequency, power, resistance, capacity, inductance.*
 - c) *Principle of documentation and data handling.*
- Project – the contents:
- Basic literature:
 1. *Chwaleba A., Poniński M., Siedlecki A.: Metrologia elektryczna, WNT, W-wa 1994.*
 2. *Miernictwo elektryczne – Ćwiczenia laboratoryjne, praca zbiorowa pod redakcją D. Koczeli, Oficyna Wydawnicza Politechniki Wrocławskiej, Wrocław 2001*
 3. *Kwiatkowski W.: Miernictwo elektryczne. Analogowa technika pomiarowa, OW Pol. Warszawskiej, Warszawa, 1998*
 4. *Tymański S.: Technika pomiarowa, WNT, Warszawa, 2007*
- Additional literature:
 1. *Dacko G., Jaskulski J., Koczela D., Miernictwo elektryczne, Skrypt Pol. Wr. 1993.*
 2. *Marcyniuk A., Pasecki E., Pluciński M., Szadkowski B., Podstawy Metrologii Elektrycznej Warszawa, WNT, 1984.*
 3. *Bartoszewski J., Koczela D.: Ćwiczenia laboratoryjne z miernictwa elektrycznego, Oficyna Wydawnicza Politechniki Wrocławskiej, Wrocław 1998.*
 4. *Orzeszkowski Z.: Podstawy metrologii elektrycznej, Wyd. Pol. Wrocławskiej, Wrocław 1981.*
- Conditions of the course acceptance/creditation: *Test*

* - depending on a system of studies